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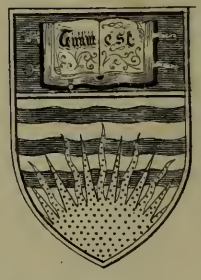

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H OR MT. ST. ELIAS.

rold W. Topham. ---------- *Author's Route.*

W. & A. K. Johnston, Edinburgh & London.

of the Royal Geographical Society 1889

YAHTSE-TAH-SHAH OR MT. ST. ELIAS.

Heights in Feet

Surveyed by Harold W. Topham.

---------- Author's Route.

SCALE OF STATUTE MILES

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Publd for the Proceedings of the Royal Geographical Society 1888

MOUNT ST. ELIAS,

FROM THE MALASPINA GLACIER.

(*From a Photograph by* Mr. H. W. Topham.)

Excerpt from the Journal and Proceedings of
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A Visit to the Glaciers of Alaska and Mount St. Elias.

By Harold W. Topham.

(Read at the Evening Meeting, April 8th, 1889.)

Map and Illustration, p. 468.

To those among my audience who were present two years ago when a paper on the same region was read by Mr. Seton-Karr to the Society, I can, I fear, offer little that is new. They will, however, have, at least this advantage, they know exactly where Mount St. Elias is situated. To those who may not, I will premise that to reach Alaska, they must cross first the Atlantic Ocean to Montreal, and then the American continent to Victoria in British Columbia, and then go up the Pacific coast by sea for a thousand miles, in order to find themselves at Sitka, the capital of Alaska. Not very far from Sitka is Glacier Bay. To the west of this is Cross Sound, and it is to the north-west of Cross Sound that the mountain range lies which it is my purpose to describe to-night.

Into Glacier Bay many large glaciers descend, only one of which, the Muir, has been explored. It is 30 miles long, and its breadth, where it runs out into the sea, is one mile. It is decreasing very rapidly, so rapidly, indeed, that the sailors assert that they can, year after year, clearly distinguish the difference in its size. The height of the ice-wall at the foot of the glacier, where it is washed by the sea, was 319 feet in 1886, whilst last year it was 266 feet, a decrease of 53 feet. The centre of the glacier moves 70 feet per day, which is equal to five miles a year. This will be appreciated better if it is remembered that the Mer de Glace in Switzerland moves 1½ foot per day, and the Aar Glacier 55 feet per year. We went up on to the ice to visit a cairn which the captain of our ship had previously erected for the purpose of ascertaining the rate of motion of the glacier. We found it almost overthrown into a crevasse, so we re-erected it and took sextant bearings from it to various peaks, for use this summer.

As far as Sitka travelling has been easy; but from Sitka to Yakatat, a distance of 250 miles, the traveller must at present take what he can get—canoes, or some sloop or schooner which has been condemned as unseaworthy further south, and has been sent up here to Alaska to end its days—a thing which these boats very often do, and bury their crews with them. It was a craft of this description which we hired, a schooner of 24 tons, with everything about her unseaworthy to a degree.

On July 3rd we left Sitka, our party consisting of Mr. George Broke, Mr. W. Williams an American, my brother, and myself, four Indians, and two American miners. We were seven days reaching Yakatat, but the wearisomeness of the journey was in some degree com-

pensated by the magnificence of the mountain range, stretching from Cross Sound to Yakatat, beneath which we were sailing. The peaks tower above you as you sail by. They reach up to 16,000 feet, the whole of which height is at once presented to the view. There is no obstruction between you and them. Their bases are washed by the sea, into which their glaciers descend. Many of these glaciers are singularly free from moraine. They are exceedingly steep, and are broken up into innumerable icefalls. One glacier in particular was perhaps the most beautiful that I have ever seen. Imagine an amphitheatre high up the mountain, with innumerable very steep glaciers dropping into it from the cliffs above. The basin cannot contain the quantity of ice poured into it, and it overflows in a splendid cascade several thousand feet in height, and broken up into countless blocks of the purest white ice. Not a dark speck is visible; all is of the same purest white. It is just as though you had filled the basin above with millions of the whitest ostrich feathers, and had then, by a superhuman effort, thrust them over the brink.

Thirty miles from Yakatat is the river Altsek. It has several mouths, and at a very short distance from the shore it forms a kind of lagoon, which has been called Dry Bay. There is an Indian village here, and canoes can be taken hence to Yakatat by means of very narrow inland channels. Several portages, however, are necessary. We met a miner who had made the journey by himself in 4½ days. The Altsek river is said to have been explored by the Indians to a distance of 100 miles from its mouth. At this distance it is said to be three miles wide, and to divide, one branch leading towards the east, and the other towards the north, of Mount St. Elias. It is swift, but has been navigated by canoes. Just before it enters the lagoon at its mouth, it passes beneath a portion of the Pacific glacier which descends from Mount Fairweather. The Indians portage across the ice, and launch their canoes above it.

The St. Elias Alps, from Cross Sound to Mount Fairweather, run close to the sea. They then curve inland, and sweep round Yakatat Bay at a distance of about 30 miles from the water. There are many fine peaks, and the eye wanders on from summit to summit till it rests upon the finest effort of all, Mount St. Elias, at the far north-west of the range. Lieut. Allen has stated this peak to be 19,500 feet high. It is believed, therefore, to be the highest mountain in North America; but I shall not be surprised if some of those peaks which are visible from Yakatat, and are far inland, prove to be as high or even higher.

At the north-east end of Yakatat Bay the sea-water flows inland through a narrow passage frequently blocked by ice into a lake known as Disenchantment Bay. This bay is said to be 30 miles long, and to be surrounded by high mountains and great glaciers. Near to the narrow entrance some coal-fields were discovered last summer. The land between mountain and sea at the east of Yakatat Bay bears evidences of having

been at one time completely covered with ice. Cape Phipps is an old moraine, and close to Yakatat village is another moraine running across the island. At the shore end of this moraine is a layer about 8 inches thick of what is known as black sand. This is sand containing a quantity of powdered garnets, crushed probably by glacier action. It was yielding $20 per day of gold to two miners. When the gold was first discovered the miners thought that it was washed up by the sea, and expected to find it all along the shore. Now, however, they restrict their search to the moraine.

To the north and west of Yakatat Bay all is ice. It is a vast plain of ice, stretching back 60 miles or more, and running 80 miles along the coast. At a place 50 miles up the glacier from the bay, we found we were only 650 feet above the sea. This gives a fall of only 13 feet to the mile, but this must be reduced to nine feet when we consider that the ice itself is not less than 200 feet thick. The rate of progress, therefore, of the ice, must be very small, and this is proved by the quantity of scrub and trees which grow upon the terminal moraine upon the top of the ice. The small headland called Point Manby on the maps is a part of this moraine, which fringes the Malaspina Glacier for miles along the coast. The moraine is several miles broad, and is covered with brush of alder and willow, and spruce. 37 miles west of Point Manby is a delta of lowland between the glacier and the sea. Several glacier rivers run through this, the chief of which is the Yahtsé-tah-hein, or muddy harbour river. It was upon this delta that we landed. It is exposed to the full fury of the Pacific, and can only be approached in quite calm weather.

On July 13th we left Yakatat village in three canoes. We had had considerable trouble with the Indians before we could hire either men or canoes. The chief made all sorts of promises which he was unable to perform, and we ourselves had to do the same—indeed, if we had presented to the chief all the clothes which we promised him we should have been left without a rag on our backs. Before deciding upon a thing Indians have to do a lot of talking. They talk the matter over with their families, and with the medicine man. Of these last there had been two in the settlement, but one of them, luckily for us, disappeared in a rather curious way. He went out in his canoe halibut fishing, and a very large halibut took his bait—and it took the doctor too. Neither fish nor doctor were ever seen again.

We landed at the delta without much difficulty, as the surf was not very high. We lay prepared in our canoes just outside the breakers, and when at last a big wave came, we concentrated all our efforts to ride in upon it to the shore. The instant the bows touch land every one jumps into the sea, and what appears to be utter confusion ensues. Indians and whites alike snatch at the first thing that comes to hand, and rush with it up the shore to throw it down out of reach of the waves.

The canoes thus lightened of part of their weight are themselves hauled up. Strewn about along the shore are tents and tea, flour and kerosene, a camera and ice-axes, a stove and blankets, pilot bread, rifles, bacon, dried salmon, snow-shoes, and frying-pans—things of all sorts and conditions, thrown anywhere and everywhere along the sands. Stormy weather detained us three nights upon the beach. On the third day we started inland on foot. Our course took us up the Yahtsé-tah river. The bed of this river is composed of mud and sand flats, through which the water rushes in innumerable channels, which are constantly changing their course. There are a number of quicksands, and wading is therefore not only cold but dangerous. It is not safe to camp upon the sand-flats as the river rises very suddenly and covers them. We therefore chose a place in a wood on an island some feet above the level of the river, and pitched our huts upon thick wet moss. The place was not good, and the mosquitoes and stinging flies were execrable, but it was the best place available.

Seven miles from the sea, the river issues from beneath the ice, and it brings with it such a quantity of dirt, that the water is of a greyish-white. The river, where it issues from the ice, is about 50 feet broad, but it divides and sub-divides to such an extent that at its mouth it is about seven miles in width. The west bank is composed entirely of ice. Where the river issues from under the ice, the latter is 500 feet thick, and possesses a moraine several miles wide, the last mile of which, the one nearest the edge of the glacier, is covered with thick brush.

Through this brush we had some difficulty in forcing our way to the open glacier beyond. The best way of describing the moraines upon the Malaspina Glacier is to liken the surface of the ice to a very choppy sea, on to which innumerable stones and rocks have been raised. The depressions are often 100 feet deep. On this moraine we found shale and slate, granite, quartz, with sulphates and pyrites and copper. At the foot of the moraine we washed out some gold.

Almost due north of us was Mount St. Elias, and between it and us lay the Chaix Hills, which block the approach to the mountain. These hills are surrounded by ice. To the west of them lie the Tyndall and Guyot Glaciers; to the east is the Malaspina Glacier. At the south end of the hills the Guyot and Malaspina meet, and Lake Castani lies at the angle of juncture. Into this lake two streams run: one from the west, and one from the east of the hills. From the south of the lake the Yahtsé-tah river makes its escape, and flows for about eight miles beneath the ice. Its track is marked above by a depression between the two glaciers, and along this depression is a deep water-course, along parts of which are banks of mud and sand many feet thick. Lake Castani is sometimes full and sometimes empty, just according as the exits from the lakes above become choked or not with ice-bergs. When the lakes above burst their bonds they send such a volume of water into

Castani, that it in turn breaks loose and discharges itself by means of the sub-glacial river.

High-water mark round Castani is fully 100 feet above the low. On one occasion we were able to cross the bed of the lake. It partly filled and emptied again several times while we were there. I believe that it sometimes discharges itself over the surface of the glacier down the watercourse mentioned above. For several miles up the river to the east there is no means of descending from the glacier, which presents a wall of ice several hundred feet high. Progress up the river is not easy, on account of the constant wading which is necessary. In some places the river-bed must be left and the glacier ascended. The Chaix Hills all along the right bank of this river are covered with vegetation. There are spruce trees and pine, cotton-wood, alder, and willow; besides which there are quantities of flowers—marguerites, ranunculus, lupins, and others.

We found here a small sulphur spring, and we washed out some gold from the river-bed.

The river has its rise from under the ice at the north-east end of the hills. At this point the Libbey Glacier descends from the very foot of St. Elias. It was here that we ascertained our height above the sea to be 650 feet. The Libbey Glacier descends in an ice-fall 1000 feet high, above which the glacier is quite flat and almost entirely covered with stones. A few tributary glaciers such as this will easily account for the great breadth of the moraine upon the Malaspina. We ascended the ice-fall and obtained an uninterrupted view of the mountain, and concluded that it was too steep upon this side to be climbed. We therefore descended to Lake Castani, in order to reach the mountain from the west of the Chaix Hills. The Malaspina Glacier has shrunk away from the hills, and has left a moraine along their sides. Nevertheless, at one place, at an angle formed by a spur of the hills, the glacier is pushing up against the side of the hills and is crushing down the scrub trees and beautiful flowers. So fast is it doing this, that branches of alder, partially covered with stones and quite alive, are peeping forth from under the débris and protesting against the encroachment of the ice. This débris consists for the most part, not of stones brought along upon the surface of ice, but of an old moraine, which is being overwhelmed and crushed, and I believe that this ice is sliding and swelling over the older ice below, so that it can have little or no effect upon the Malaspina Glacier taken as a whole. There are no signs along the edge of the latter down by the mouth of the Yahtsé-tah, that it is either advancing or receding. There are no piles of stones left behind to indicate its retreat, and no trees crushed down to show it advances. The Malaspina is a vast plateau of ice, which cannot be much less than 5000 square miles in extent, and as we have seen that it has a fall of only nine feet to the mile, I think it fair to suppose that it is at rest.

From Castani we ascended the Guyot and then the Tyndall Glaciers, making several camps upon the hills to the west, and after several ineffectual attempts we succeeded in crossing over the ice to the foot of St. Elias, and pitched camp on a small patch of grass and heather, the only green spot on this side of the mountain. All around was rock, ice, and snow. Some thousands of feet above us we could see the most conspicuous feature of the mountain—namely, the so-called crater. Beyond and above the upper rim of this we could just see the summit of the peak. Several ridges of steep rocks ascend from the glacier to the lower rim of the crater, and it was up one of these that we hoped to ascend. These rocks were composed of shale, slate, and quartz grit. No rocks of volcanic formation were found upon the mountain itself. Near the upper rim of the crater we passed a cone of rock shaped like a sugar-loaf, which Williams said resembled the lava cones of Kilauea in Hawaii. It was about eighty feet high, and forty broad at the base, and was composed of numerous stones of irregular shapes, having flat even surfaces, and fitting into each other like mosaic-work. But in the absence of certain knowledge that the cone was volcanic, I am inclined to think that the so-called crater is no crater in the true sense of the word, and that it is not due to plutonic agency. Five only of our party came to this new camp—Williams, my brother, two packers, and myself. Broke, owing to an accident, was most unfortunately obliged to stay at the camp on the other side of the glacier.

We left our Indians, too, over there. They expressed a decided desire to go no farther; they said they were afraid, and spent the greater part of the time during our absence in chanting mournfully. When asked why they chanted, they answered, "Indians have sick tumtum, and want go home." The word tumtum means a variety of things, from a bootjack up to the soul. This time it meant "mind, spirit," and implied weariness. They were chanting one night in this way, when some bears came round to the tent and gave them such a scare that Broke had peace for the rest of that night.

We spent two days in trying to find a way up to the "crater," and reached it eventually after an eight hours' climb upon one of the ridges. More than an hour of this had been spent in cutting up a steep ice ridge. We therefore knew that we must try another route, and next day, August 2nd, we slept out 1500 feet above our camp. Our two packers accompanied us thus far. Though strong and willing, they proved themselves unable to climb with packs on their backs, and so our hopes of being able to camp higher up were gone. The things we carried up to this last sleeping place were curious. Besides our packs, one man carried a coffee-pot full of stewed figs, and I carried above my pack a kerosene stove, and in one hand a camp kettle containing cold stewed marmots, which we had slain down below with our ice axes. It had taken us several hours to slay them, but every bit of fresh meat was precious.

One of the packers had a fall. He slipped upon some steep snow and went headlong. His own account of his behaviour was, "I seed I must fall anyways, and if I didn't fall right there I must fall in the *more rain* in front; so I dropped my axe, and then dropped myself." He was not a member of the Alpine Club! We started early next morning, and three hours brought us to the brink of the crater, 7600 feet above sea-level and 5000 above the Tyndall glacier, and another six hours found us at a height of 11,461 feet. We were then on the northern and upper rim of the so-called crater, and we judged the summit to be another seven or eight thousand feet above us. The latter I believe to be the more correct.

The bottom of the crater is full of ice, and upon its precipitous cliffs are a number of overhanging glaciers, splashed, as it were, upon the rocks and detached from the snow-fields above. This is characteristic of a number of the glaciers in the neighbourhood. There they are—right on the rocks, with yawning crevices upon them broken up and ready to topple over upon you. Perhaps in a few years they will have melted entirely away. Everything around St. Elias bears evidence to the conclusion that the long period of ice through which the land has been passing is now coming to an end.

The panorama obtained from the point reached was very wonderful. The distances were immense. To the north-west we could see many ranges of hills with huge glaciers between them. Most of these mountains appeared less than 7000 feet high, but there were several very much higher, and I believe that we saw Mount Wrangel, which Lieutenant Allen states to be 17,500 feet high, the second highest mountain in North America.

The Malaspina Glacier appeared with its moraines like a huge race-course, and the streaks of débris at the west end of the course had fashioned themselves into the semblance of Saturn's rings. This glacier filled up the whole space to the east as far as the horizon. Mount Fairweather, distant 150 miles, stood up beyond. To the south we could distinguish the sea and the mouth of the river. The greater part of the Malaspina Glacier, and certainly nine-tenths of the white ice, comes from between Mount St. Elias and Mount Cook. The ice coming from the south of Elias is covered with débris, shale, and slate, for the most part such as we had been climbing up. This formation renders climbing very tiring work. No step is quite safe. Whole masses of rocks become dislodged and fall thundering down the mountain side, and so thick was the cloud of dust which enveloped us on our descent, that the last man had great difficulty to see where to walk. There is a couloir about 3000 feet in height, down which stones are continually falling, owing to the rapid disintegration of the mountain. They never cease falling, and a pillar of dust ascends high into the air, giving the appearance, when seen from a distance, of steam or smoke, and the wind plays upon

the dust just as it plays upon the Staubbach and other high waterfalls, wafting it to and fro and sporting with it as it likes. As we approached the mountain from the Tyndall Glacier, we had been under the impression that the pillar of dust was smoke or steam due to volcanic agency, and although we had examined the phenomenon through a powerful telescope, we continued of the same opinion until we arrived close to it and discovered its true nature. The Tyndall Glacier forms a very small part of the Guyot, but most of the moraine upon the latter descends from the southern slopes of Elias. The Guyot Glacier stretches away out of sight to the south. The Chaix Hills are in the shape of a great V. At the angle of the V are snow-fields, connected with a short range of hills of a reddish sandstone. These run north, and connect with St. Elias. On the west side of the Tyndall Glacier are several smaller glaciers descending from the range of hills which flank the Tyndall on that side. The hills are of grey sandstone, shale, and slate. Upon these hills we found many seams of coal, and some fossils of the Miocene, or perhaps Eocene, period on their glaciers. Upon the east lateral moraine we found hornblend, shale, amygdaloid, and some granite.

From where we were upon St. Elias, we could see that a branch of the Guyot Glacier descends from the northward of the peak and passes behind these hills. This fact coupled with that mentioned above, that the greater portion of the Malaspina Glacier appears to come from the north-east of St. Elias, makes me think that the mountain itself is not at the summit of the watershed. This is interesting only to those who are anxious to place Mount St. Elias in Canadian territory, because the boundary, according to treaty, was to run parallel to the coast, at a distance of ten leagues, except where the summit of the watershed came within that zone, in which case the watershed was to be the frontier.

There is vegetation upon the south-east slopes of these hills to a height of 1500 feet above the glacier. The greatest height at which we found vegetation, exclusive of lichens, was 4500 feet above the sea, but the place was exposed to the full glare of the sun, and no other vegetation was found for an interval of 1500 feet below. On the southern slopes I should put the snow-line at about 2500 feet; on the northern it is very much lower. The plants found at the greatest height were *Sedum*, *Polemonium*, *Campanula lasiocarpa;* the latter is only found in North-west America. Lower down were *Veronica alpina*, *Epilobium alpinum*, *Saxifraga tricuspidata*, *Arnica montana*, *Trientalis Americana*, a small heath, *Platanthera dilatata*, asters, strawberry plants, lupins, red columbines, spiræa, white ranunculus, *Mimulus luteus*, spruce, *Epilobium latifolium*, *Viola palustris*, salmonberries, currants, cotton-wood, and *Veronica serpyllifolia*. I must not forget devil's club (*Fatsia horrida*), the most difficult plant to get around that I know.

The glaciers which descend on the west of the Tyndall are consider-

ably lower than the latter at their junction with it. The Tyndall actually drains on to its tributary glaciers, and the water then runs away below the former. The Tyndall is itself considerably lower than the Guyot at their juncture, which is marked by a regular high bank of ice stretching across the glacier. This bank marks the higher level of the Guyot Glacier. This suggests that all the glaciers are disappearing, but that the smaller ones are the first to go.

A characteristic of these Alaskan glaciers is the curious way in which small isolated bits of moraine show up here and there above the ice. For example, you may walk down the centre of the Tyndall upon white ice without seeing more than a few stones to suggest the existence of a moraine, and suddenly you will come upon an island of débris, disconnected from any regular moraine. It springs from nowhere, is quite isolated, and appears to have no reason for being there. Upon the Malaspina are such islands, which must be 100 feet high.

At the foot of the ice-fall of the Guyot near Castani, there is a quantity of glacial mud, which collects in hollows and terraces upon the ice. The mud is covered with stones, which cause you to think that the surface is hard, but when you tread upon it you find your error, for you sink to your knees, and have difficulty in getting free.

The highest point we reached was 11,461 feet. Our heights were taken by boiling-point thermometers and aneroid: the latter at our highest point registered 86 feet lower than the thermometers. I think the next expedition to the mountain should try to ascend from the north; but the traveller should start from Sitka fully provided with everything he needs until his return, and must be quite independent of fresh food. I was told subsequently, by George, the second chief at Yakatat, that he had once made a journey after goats towards the north of the peak, and that the northern sides were much less steep than the southern, and were covered with snow. He landed further west than we did, near a river similar to the Yahtsé-tah, and made three days' journey inland over ice. It is characteristic of the Indian character that he never said a word of this till our return to Yakatat. Until the Indians are sure of your good intentions, they will give you no help. I learned, too, from George, the origin of the name Yahtsé-tăh. There is a tradition amongst his people, that formerly there was a large bay running up from the sea to the very foot of St. Elias; that there was a village at the head of that bay; that all around the village was swampy or muddy (Yahtsé) ground; that the mountain was therefore called Yahtsé-tah-shah, *tah* meaning harbour, and *shah* meaning peak; that a river flowed into the bay from the north-west, where were large glaciers; that the east of the bay was all ice, but the west, sand and trees; that at the mouth of the bay dwelt some Indians, and that one day an Indian came rushing home crying "Quick, quick, the ice is coming," pointing to the river down which the ice was seen

to be rapidly advancing. The Indians escaped along the shore. The ice came on right across the bay, till it struck the opposite shore, when it turned and continued down the bay to the sea, swallowing the village in its course.*

Our natural history collection was not very great, but then very few animals will condescend to live upon ice. We saw wolves and several bears; upon the Chaix Hills we found a shrewmouse and a char. This last was in a rivulet running into Lake Castani, and to arrive here that fish had had to force its way up the river beneath all those miles of ice. But there is no accounting for taste, and perhaps, if asked its opinion, the fish would have said that swimming beneath the ice was just as sensible as walking above it.

Ptarmigan are very plentiful on the hills, and we killed a number of brent geese.

On our way down to the coast we slightly varied our route by keeping entirely upon the Guyot Glacier which we found very much easier to walk upon than the Malaspina. It is not broken up to the same extent and its moraines are much less extensive.

We got back again to Yakatat on August 8th, and were detained there for several weeks, owing to the non-arrival of our schooner. Eventually some of the party descended the coast in a canoe and sent up a schooner from Sitka to fetch those left behind, who after a narrow escape from shipwreck reached Sitka upon the 17th of September.

After the reading of the above paper—

Mr. D. Freshfield said that he had been furnished by Mr. H. W. Seton-Karr, who, it would be remembered, had described two years ago to the Society his visit to Mount St. Elias and the shores of Alaska, with a note on the position of Mount St. Elias with regard to the British American frontier-line, the purport of which was to show that the American claim to the mountain was still more than doubtful. Mr. Seton-Karr—who had just sailed for South Africa—wrote as follows:—

"I should be glad if I might be allowed to make a few remarks upon the topographical position of this, the highest mountain in North America; the highest, since Lieut. Allen (who ascended the Copper river in 1884) has reduced his estimated height of Mount Wrangel from 20,000 feet to something considerably lower than St. Elias; as given in the published account of his journey, St. Elias is, therefore, the undisputed monarch of the North American Continent.

"The international boundary between Alaska on the one hand, and the British Colonies of Columbia and the North-west Territory on the other, is fixed by treaty to follow the watershed along the coast where that watershed is within a distance of ten leagues of the coast. At points where the watershed is not within that zone the boundary line is to run parallel to the coast, at a distance from it of ten leagues; it then follows the 141st meridian of longitude from the point of intersection northwards to the Arctic Ocean.

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* This tradition seems to point in a confused way to the breaking up of some glacier lake, causing a catastrophe similar to those in the Œtzthal and Val de Bagnes in the Alps and the Devdoraki Glacier in the Caucasus.—D. W. F.

"If then St. Elias is west of this degree of longitude it belongs to the United States. If east of it and within 30 miles of the coast, then half must belong to Canada's North-west Territories. If the mountain is over thirty miles distant from the coast, then Canada can claim the whole.

"Mr. Topham's party, Mr. Schwatka, and myself are agreed in placing it over thirty miles from the coast. But this would not make it British unless it is also east of the 141st meridian. On this point I offer the following arguments:—Vancouver in his travels, states that the length of time he had remained within sight of Mounts Fairweather and St. Elias, had afforded him many opportunities for observations for ascertaining their situation. That of St. Elias he gives as lat. 60° 22′ 30″, and long. 139° 39′. The other navigators (I am not aware whether or not without exception) also place the mountain east of the present international boundary. In 1874 the U.S. Coast Survey observed a series of vertical angles from Yakutat about 60 miles distant, on Mount St. Elias. Their triangulation fixed the position of the mountain as lat. 60° 22′ 6″, and long. 140° 54′ 00″, or within six minutes of the boundary. This position was incorporated in Professor Davidson's 'Coast Pilot of Alaska,' he being head of the Coast and Geodetic Survey. As I believe these were the only observations taken, and as there have been no later ones, it requires to be explained why the position of St. Elias was subsequently shifted. In the next edition of this volume, which is called 'The Pacific Coast Pilot,' and bears the date of 1883, Mount St. Elias is forced to make a fresh jump, and this time clear over the boundary. This new position, for which no reasons are given, is lat. 60° 20′ 45″ N. and long. 141° 00′ 12″, or just 12 seconds over the line, and—needless to say—on the American side.

"When I landed at San Francisco, in 1886, from Alaska, the newspaper editors asserted that any statement questioning the claim of the United States to Mount St. Elias would adversely affect their circulation and inflict an injury upon their reputation, so I was compelled to say nothing about it. But Mr. Dall himself, after reading my paper in the 'Proceedings' of the Society, wrote from the Department of the Interior, dating his letter May 25th, 1887 (published in 'Proceedings,' vol. ix. p. 444) admitting that the position of the summit was still a matter of controversy, "within two or three miles, or in all probability less than one mile." I would also quote the following single sentence from Mr. Dall's letter, 'The shore-line of the Alaskan coast between Yakutat and Prince William Sound, is not, and never has been correctly located."—H. W. Seton-Karr.

Mr. Freshfield continued:—The Horatian maxim, "Si possis rectè, si non quocumque modo, rem," may be in favour with Californian newspapers but it will hardly be adopted by the scientific staff of a great nation—even for the sake of acquiring so big a "rem" as Mount St. Elias! We might trust the accurate observers of the U.S. Survey to furnish us, before long, with observations that would be decisive of the rival claims, which reminded him of those now being urged in France and Italy with regard to the actual crest of Mont Blanc. He felt assured that the Alaskan coast—in some respects the grandest in the world, where mountains loftier than the Alps rose close to the coast-line and sent down their glaciers to meet the waves of the Pacific Ocean—would, before long, become a pleasure-resort for the enterprising Americans of the Far West. Science should be the gainer; for nowhere will glacial action, on a great scale, be better studied in many of its features. The region is still in the state of Switzerland in the last glacial period, and the present retreat of the Alaskan glaciers, described by Mr. Topham, may enable observers to judge for themselves whether these great ice-streams have exerted, or are exerting, such erosive action as has been attributed to their extinct Alpine predecessors. He had touched on the question of glacial erosion (which many of the best geologists consider settled in

the negative, but which some geographical text-books still treat in a very different spirit) in a recent paper in the 'Proceedings' (December 1888), the arguments of which he would not repeat. He finally called attention to the fact that the outline of Mount St. Elias, shown in photographs, had none of the characteristic features of a volcano. He felt convinced that whatever traces of volcanic action might be found in its vicinity, the mountain itself was not of direct volcanic origin. This conclusion he found had been anticipated from local knowledge, fourteen years ago, by Mr. Dall, in a Report on Mount St. Elias, &c.,* and it was high time, therefore, the fiction was dismissed. With regard to the alleged eruptions in 1839 and 1849, referred to by Mr. Dall, he might mention that similar legends were not infrequent. An eruption of Ararat had been imagined on the strength of a great rockfall in the present century. In the last century (1751) Donati was sent from Turin to report on a new volcano said to have broken out in Savoy. The catastrophe was, in reality, a great landslip from the Rochers des Fyz, near Servoz; the facts are recorded by De Saussure ('Voyages,' vol. ii. p. 414). Mr. Freshfield had himself, in 1867, from the chain of Mont Blanc, some twenty-five miles distant, seen the dust rising to heaven like a cloud of smoke from a great earthfall which took place near the Little St. Bernard Pass. The hillside continued to fall, and consequently the dust-cloud to rise, for several weeks, and no observer at a distance would have guessed its nature and origin.

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